

DESIGN AND DEVELOPMENT OF AN INTERNET OF THINGS (IoT) BASED WATER LEVEL MONITORING AND FLOOD EARLY WARNING SYSTEM

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ABSTRACT

This research was conducted to design and develop an Internet of Things (IoT)-based water level monitoring and flood early warning system using an ESP32 microcontroller. The system utilizes a JSN-SR04T ultrasonic sensor to measure the distance to the water surface. The measurement data are then processed by the ESP32 and transmitted through a Wi-Fi network to Firebase Realtime Database before being displayed on a mobile application in real time. Testing was carried out to determine the sensor accuracy, notification functionality, and the time required for data synchronization between the device and the application. The test results show that the JSN-SR04T sensor can operate effectively within a range of 20–250 cm with an average accuracy of 99.02% and an average error rate of 0.98%. At distances below 20 cm and above 250 cm, the sensor has limitations in performing measurements. The synchronization test resulted in an average data transmission time of 0.8 seconds from the ESP32 until the data was displayed on the application. The system is also capable of identifying water conditions into three categories, namely Safe, Alert, and Danger, and providing notifications according to the predetermined thresholds. Based on the test results, the developed system can assist in monitoring water levels and providing early warnings of potential flooding in real time.

Keywords: *Internet of Things (IoT), JSN-SR04T, ESP32, Mobile Application, Monitoring.*